In the Claims

1. (Previously Presented) A depletion mode floating gate transistor, comprising:

a first source/drain region and a second source/drain region separated by a channel region in a substrate;

a floating gate opposing the channel region and separated therefrom by a gate oxide;

a control gate opposing the floating gate; and

wherein the control gate is separated from the floating gate by an asymmetrical low tunnel barrier intergate insulator.

2. (Currently Amended) The depletion mode floating gate transistor of claim 1, wherein the asymmetrical low tunnel barrier intergate insulator includes aluminum oxide (Al_2O_3), wherein the aluminum oxide has a number of small compositional ranges such that gradients can be formed which produce different barrier heights at an interface with the floating gate and control gate.

3. (Original) The depletion mode floating gate transistor of claim 1, wherein the asymmetrical low tunnel barrier intergate insulator includes an asymmetrical transition metal oxide.

4. (Original) The depletion mode floating gate transistor of claim 3, wherein the asymmetrical transition metal oxide is selected from the group consisting of Ta_2O_5, TiO_2, ZrO_2, and Nb_2O_5.

5. (Original) The depletion mode floating gate transistor of claim 1, wherein the asymmetrical low tunnel barrier intergate insulator includes an asymmetrical Perovskite oxide tunnel barrier.

6. (Original) The depletion mode floating gate transistor of claim 5, wherein the asymmetrical Perovskite oxide tunnel barrier is selected from the group consisting of $SrBi_2Ta_2O_3$, $SrTiO_3$, $PbTiO_3$, and $PbZrO_3$.

7. (Original) The depletion mode floating gate transistor of claim 1, wherein the floating gate includes a polysilicon floating gate having a metal layer formed thereon in contact with the asymmetrical low tunnel barrier intergate insulator.

8. (Previously Presented) The depletion mode floating gate transistor of claim 7, wherein the control gate includes a polysilicon control gate having a metal layer formed thereon in contact with the low tunnel barrier intergate insulator, wherein the metal layer includes a metal layer that has a different work function than the metal layer formed on the floating gate.

9. (Original) The floating gate transistor of claim 1, wherein the floating gate transistor includes an n-channel type floating gate transistor.

10. (Previously Presented) A vertical, depletion mode non volatile memory cell, comprising:
a first source/drain region formed on a substrate;
a body region including a channel region formed on the first source/drain region;
a second source/drain region formed on the body region;
a floating gate opposing the channel region and separated therefrom by a gate oxide;
a control gate opposing the floating gate; and
wherein the control gate is separated from the floating gate by an asymmetrical low tunnel barrier intergate insulator having a number of small compositional ranges such that gradients can be formed which produce different barrier heights at an interface with the floating gate and control gate.

11. (Original) The vertical, depletion mode non volatile memory cell of claim 10, wherein the asymmetrical low tunnel barrier intergate insulator includes an insulator selected from the group consisting of Al_2O_3, Ta_2O_5, TiO_2, ZrO_2, Nb_2O_5, $SrBi_2Ta_2O_3$, $SrTiO_3$, $PbTiO_3$, and $PbZrO_3$.

12. (Original) The vertical, depletion mode non volatile memory cell of claim 10, wherein the floating gate includes a polysilicon floating gate having a metal layer formed thereon in contact with the asymmetrical low tunnel barrier intergate insulator.

13. (Previously Presented) The vertical, depletion mode non volatile memory cell of claim 12, wherein the control gate includes a polysilicon control gate having a metal layer formed thereon in contact with the low tunnel barrier intergate insulator, wherein the metal layer includes a metal layer that has a different work function than the metal layer formed on the floating gate.

14. (Previously Presented) The vertical non volatile memory cell of claim 8, wherein the floating gate includes a vertical floating gate formed alongside of the body region.

15. (Previously Presented) The vertical non volatile memory cell of claim 12, wherein the control gate includes a vertical control gate formed alongside of the vertical floating gate.

16. (Previously Presented) The vertical non volatile memory cell of claim 8, wherein the floating gate includes a horizontally oriented floating gate formed alongside of the body region.

17. (Previously Presented) The vertical non volatile memory cell of claim 14, wherein the control gate includes a horizontally oriented control gate formed above the horizontally oriented floating gate.

18. (Original) A non-volatile memory cell, comprising:

a first source/drain region and a second source/drain region separated by a channel region in a substrate;

a polysilicon floating gate opposing the channel region and separated therefrom by a gate oxide;

a first metal layer formed on the polysilicon floating gate;

a metal oxide intergate insulator formed on the metal layer, wherein the metal oxide intergate insulator includes an asymmetrical metal oxide having a number of small compositional ranges such that gradients can be formed in an applied electric field which produce different barrier heights at an interface with the floating gate and control gate;

a second metal layer formed on the metal oxide intergate insulator, wherein the second metal layer has a different work function from the first metal layer; and

a polysilicon control gate formed on the second metal layer.

19. (Currently Amended) The non-volatile memory cell of claim 18, wherein the first metal layer includes a parent metal for the asymmetrical metal oxide and the second metal layer includes a metal layer having a work function in the range of 2.7 eV to 5.8 eV.

20. (Original) The non-volatile memory cell of claim 18, wherein the second metal layer is platinum (Pt) and the metal oxide intergate insulator is selected from the group consisting of TiO_2, $SrTiO_3$, $PbTiO_3$, and $PbZrO_3$.

21. (Original) The non-volatile memory cell of claim 18, wherein the second metal layer is aluminum and the metal oxide intergate insulator is selected from the group consisting of Ta_2O_5, ZrO_2, $SrBi_2Ta_2O_3$, $SrTiO_3$, $PbTiO_3$, and $PbZrO_3$.

22. (Original) The non-volatile memory cell of claim 18, wherein the metal oxide intergate insulator is selected from the group consisting of Al_2O_3, Ta_2O_5, TiO_2, ZrO_2, Nb_2O_5, $SrBi_2Ta_2O_3$, $SrTiO_3$, $PbTiO_3$, and $PbZrO_3$.

23. (Previously Presented) The non-volatile memory cell of claim 16, wherein the floating gate transistor includes a vertical floating gate transistor.

24-84. (Canceled)